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FM AMEMBASSY KINSHASA

TO RUEHC/SECSTATE WASHDC 8474

RUEHLS/AMEMBASSY LUSAKA 1469

RUEHSA/AMEMBASSY PRETORIA 4113

INFO RUCPDOC/DEPT OF COMMERCE WASHDC

RHEBAAA/DEPT OF ENERGY WASHDC

RUEHC/DEPT OF LABOR WASHDC

RUEAIIA/CIA WASHDC

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SIPDIS

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DEPT FOR AF/S, EEB/ESC AND CBA

DOE FOR SPERL AND PERSON

E.O. 12958: N/A

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SUBJECT: DRC COPPER BELT: DREAMS, OPPORTUNITIES, AND CHALLENGES

REF: A) KINSHASA 515

B) LUSAKA 666

C) LUSAKA 744

D) KINSHASA 646

E) KINSHASA 663

¶11. (U) This cable represents the sixth and final in an innovative collaboration in resource reporting and commercial advocacy between Embassies Pretoria, Kinshasa, and Lusaka (reftels). Embassy Pretoria Minerals/Energy Officer and Specialist visited six of the largest mines in the DRC (and four in Zambia) May 12-23, accompanied by Embassy Kinshasa or Lusaka Specialists.

¶12. (SBU) SUMMARY: Global copper-cobalt supply shortage and commodity price escalation have provided the incentive for international mining companies to invest in new exploration and mega-projects in the DRC and the Central African Copperbelt. The Copperbelt straddles the DRC/Zambia border and represents the world's greatest source of cobalt and the second greatest resource of copper, after Chile. Combined copper production from both sides of the border is likely to reach one million tons within the next five years, a figure last achieved in the 1960s and 1970s before the wars in the DRC and nationalization in Zambia. Investment has flowed into the region, despite significant lack of skills and infrastructure, in combination with an uncertain power supply. Recent actions by the DRC government and the Governor of Katanga Province have caused some uncertainty in the investment environment, which could have negative implications for incremental investment. The mining licence review and measures to fight mineral export fraud are intended to boost the DRC's income from copper and cobalt mining, but red tape, corruption, and higher taxes are driving up costs and uncertainty for companies. Nevertheless, companies will persevere with short-term commitments because of the huge opportunities and costs already incurred. End Summary.

Compelling and Unique Geology

¶13. (SBU) All mines visited in both the DRC and Zambia occur within

the world-renowned Lufilian Arc. The Arc is a geological feature estimated to be 1,050 million to 650 million years old, which stretches some 500 kilometers from Angola in the west, across the southern DRC and into Zambia. Earlier interpretations of the geology of the "traditional" Copperbelt envisaged a simple sedimentary-hosted, strata-bound type of mineral deposit. More recent research has shown that the geology and mineral associations are much more complex, particularly in newer remote mines, and that mineralization differs in age and characteristics from mine to mine.

This has opened up a whole new vista of exploration targets. South American copper deposits are bigger in tonnage, but DRC and Zambian deposits have much higher grades and many contain cobalt. The DRC deposits also have higher grades of both minerals than their Zambian neighbors and leads to a conclusion that the northern "limb" of the Arc may have a different mineral footprint than the southern "limb" in Zambia.

Increasing Government Take

¶4. (SBU) The Democratic Republic of Congo (DRC) is one of the most attractive mining areas in Africa, particularly since the post civil war elections of 2006. Corruption and the smuggling of ores and concentrates across borders have deprived the government of tax revenues needed to fund the budget. As a response, the Governor of Katanga Province last year banned exports of ores and concentrates containing less than 15 percent copper, and cracked down on customs agents involved in fraud. These measures, combined with an overall rise in production, have increased government revenues, according to Katanga Mines Minister Bartelemy Mumba Gama in press reports, but

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red tape and higher local taxes are driving up costs for companies.

Review of Mining Leases

¶5. (SBU) The GDRC claims that many of the mining leases signed prior to 2002, a time of civil war in the DRC, were one-sided in favor of the mining companies. The current high prices of copper and cobalt have exacerbated these perceived inequities and the government asserts it is not receiving an appropriate share of the "windfall" revenues. The GDRC announced early this year that it would review 61 mining licenses and that most contracts would need to be renegotiated, with respect to royalty payments and government ownership through mining parastatal GECAMINES. Completion of the review remains scheduled for September 30. Companies like Freeport-McMoRan (Tenke Fungurume), Metorex (Ruashi), First Quantum (Kolwezi Tailings), and Anvil (Kinsevere) are particularly vulnerable because they had negotiated a change in the license convention which reduced GECAMINES' share-holding, a practice reportedly not permitted in the current mining code. A principal concern for the companies, NGOs such as the Carter Center who have provided technical assistance, and the USG has been the lack of transparency in the process. While the GDRC did publish general terms of reference for the contract renegotiation process, the next step for these vulnerable "category B" licenses is not clear and transparent as companies apparently negotiate one on one with the GDRC. These companies fear that the license review could serve as a pretext to take concessions to award to Chinese interests as part of China's significant and opaque infrastructure loan (Ref A).

Power and Infrastructure

¶6. (SBU) Power (mainly hydro-electric) is generated in the DRC by Socit Nationale d'Electricit (SNEL), the government-owned electricity company. Shortages of power are endemic in the DRC due to a lack of capacity for maintenance of turbines and transmission lines. The mining companies have managed to secure a reasonably adequate and reliable supply through a number of initiatives ranging from financing to rehabilitating and building power lines, sub-stations, generation turbines, and DC-AC converter facilities. Comparable shortfalls apply to the country's road system, which is in a state of advanced decay. For most mines, these roads are the

only means of moving equipment, supplies, and product to site and market. Rail lines are operational, but because of their limited range and coverage, as well as lack of rolling stock, skills and parts, and poor management, the rail service is expensive, inadequate, and inefficient, and generally avoided by mining operators where roads are an option.

Social Commitments - A License to Mine

¶7. (SBU) All mines on the DRC Copperbelt, and especially in the remote areas, express commitment to programs of social development and upliftment on the mines and in the surrounding communities. The mines would lose their "social license to mine" and encounter labor and community unrest without such programs. All mines visited have robust social programs in place, generally tailored to the particular needs of the local communities. Provisions include mine housing, medical, educational, power, water, social infrastructure, nutrition schemes, recreational facilities, subsidizing salaries for teachers and medical staff, and support for small business projects by providing the facilities, materials and markets for products, such as brick-making, vegetables-growing, Jatropha-growing for bio-fuels, and briquette-making using Jatropha residues. A major feature of the social programs is the great effort being allocated for training locals, who in most instances have limited exposure to

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the techno-industrial world. Companies have committed to training and hiring locals to fill most of their mining positions. It is widely perceived that Chinese and domestic mining companies do not adhere to the same commitment to social development, skills transfer/training, and safety.

Mine Visits

¶8. (SBU) The collective Embassies' mining team visited the following mines and facilities in the DRC:
-- Tenke Fungurume Mining copper/cobalt open pit mine owned by Freeport-McMoRan of the United States (57.75 percent), Lundin Mining of Canada (24.75 percent) and DRC parastatal GECAMINES (17.5 percent); capex \$1.7 billion; hosted by the Processing General Manager Sam Rasmussen;
-- Kolwezi copper/cobalt tailings project owned by First Quantum of Canada (65 percent), State-owned Gecamines mining company (12.5 percent), South African government-owned Industrial Development Corporation (10 percent), International Finance Corporation (7.5 percent), and the GDRC (5 percent); capex \$553 million;
-- Lonshi small open pit high-grade oxide copper mine owned by First Quantum of Canada (100 percent); capex \$25 million;
-- Frontier open pit sulfide copper mine owned by First Quantum of Canada (95 percent and Gecamines (5 percent); capex \$226; (DRC Country Manager Jeffery Ovian accompanied the team on all visits to First Quantum mines)
-- Ruashi open pit oxide copper/cobalt mine owned by Metorex of South Africa (80 percent) and Gecamines (20%); capex \$220 million; hosted by Mine Manager Grant Dempsey; and
-- Kinsevere open pit oxide copper mine owned by Anvil of Australia (95 percent) and Mining Company of Katanga (MCK) (5 percent); capex \$420 million; hosted by Vice President DRC Operations Toby Bradbury.

Tenke Fungurume an Awakening Giant

¶9. (SBU) Tenke Fungurume Mining's (TFM) copper/cobalt oxide deposits comprise one of the world's largest and richest known copper-cobalt resources, which still remains extensively under-explored. TFM is being developed west of Lubumbashi in Katanga Province for a 40-year production life. It is considered a mega-project and will be the largest mine in the region. The operator is Freeport-McMoRan, which holds an effective 57.75 percent stake. Latest estimates show TFM investment will reach \$1.7 billion, nearly double the previous estimate, as a result of scope changes and cost of additional infrastructure. Part of the investment will go to funding power and transport infrastructure

needed by the mine and the region. Major Capital Items (\$-millions) include:

-- Mining fleet	\$ 40
-- Copper/Cobalt plant	\$410
-- Indirect costs	\$232
-- Total	\$682

¶10. (SBU) TFM's high-grade oxide copper-cobalt deposits lie on the northern edge of the Lufilian Arc. The geology is complex and mineralization has taken place in a number of events over geological time. Subsequent tectonic action has given rise to multiple mineralized dome structures of which some twenty-one occur in the TFM lease area. Currently three are being developed for mining. The dome structures are amenable to mining using a unique \$1.6 million U.S.-built Vermeer surface miner. The surface miner uses a rotating drum studded with titanium-hardened steel to rip and fragment surface ore and waste rock down to a depth of about 60 centimeters. The rock is selectively removed by front-end loaders and transported to respective waste and graded ore stockpiles to await completion of the processing plant. Mining has begun on the

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first such outcrop known as Kwatebala. Copper/Cobalt Ore Reserves and Resources estimates are:

	Million Tons	Copper%	Cobalt%
Reserves	100	2.27	0.33
Resources	503	2.80	0.24
Total Reserves/Resources	603	2.71	0.26

¶11. (SBU) An oxide ore processing plant is under construction and commissioning is planned for early 2009. The initial annual mining rate will be 115,000 tons of copper and 8,000 tons of cobalt, with plans to expand production to 400,000 tons copper and 28,000 tons cobalt in the next five years. Processing will comprise a standard crushing, milling, and sulfuric acid leach circuit, followed by solvent extraction and electro-winning (SX/EW) of the copper to produce cathode copper. A separate cobalt refinery will produce cobalt hydroxide. Egress is a vexing challenge. It will require some 450 truckloads per year on bad roads to carry copper cathode to Durban port for export. The plant will also produce sulfuric acid for its own use and for sale. Tenke management claims the mine is committed to zero discharge from its tailings reservoir.

¶12. (SBU) Freeport has agreed to supply a loan to the state power utility SNEL to fund investment in regional power infrastructure, including expanded electrical power-generation capacity and improved power reliability. Rasmussen told the team that TFM will refurbish two of four turbines at the Nseke hydroelectric facility, providing 250 megawatts of power of which TFM will use only 80. TFM has put in place substantial social development investment, asserts it is committed to the Equator Principles, and works closely with a number of international NGOs such as Pact and ISOS to implement a robust social development program. TFM currently employs 5,000 people, mainly from local communities, while under construction and will employ 1,000 employees when in full operation.

Kolwezi Oxide Tailings Project - Cleaning up the Mess

¶13. (SBU) The Kolwezi Tailings project will ambitiously exploit one of the world's largest resources of primary cobalt, and also recover substantial amounts of copper. These metals are contained in two immense dumps of floatation tailings from the treatment of high-grade ore from the KOV and other nearby mines from 1952 onwards. The then prevailing processing technologies techniques failed to recover large amounts of copper and cobalt, which were discharged into the two tailings dams. The project is located outside the town of Kolwezi and west of TFM in Katanga Province. The area was the center of extensive mining activity in the 1930s to 1960s and little care was taken in disposing of mine tailings, which were often pumped into streams and dams. The project operator is First Quantum, which holds a 65 percent stake in the project. Management is bitter that the GDRC labeled this project as one of the few "Category C" projects, a designation for the recommended

cancellation of a contract.

¶14. (SBU) The resources consist of two tailings dams holding 40 and 72 million tons of "ore", respectively. The 72-million ton resource is about 11 kilometers long and partially lies under a dam that will be mined by dredge. The above-water portion will be mined using hydro-mining techniques using high-pressure water to break down the tailings into a sludge that will be pumped to a conventional solvent extraction/electro-winning (SE/EW) treatment plant. The smaller resource will also be mined hydraulically. The planned SE/EW plant will be the biggest in Africa at four times the capacity of First Quantum's Bwana Mkuba plant and twice that of First Quantum's own Kansanshi plant, both in Zambia. The combined resource has been estimated as 113 million tons grading 0.32 percent cobalt and 1.49 percent copper.

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¶15. (SBU) Project construction is under way. Capital expenditure for the base case is estimated at around \$553 million. The plant will initially treat 2.5 million tons of tailings per year to produce 35,000 tons of copper cathode and 7,000 tons of cobalt hydroxide (about 4,200 tons cobalt metal equivalent). It is being designed and constructed so that capacity can be doubled for an incremental capital cost of \$40 million. Thereafter, plant expansions will treat 4.3 million tons per year and produce 105,000 tons of copper and 17,400 tons of cobalt hydroxide (12,600 tons contained cobalt) per year over 20 to 27-year life, depending on markets and practical experience. Commissioning of the project is scheduled for the fourth quarter of 2009, and commercial production for the first quarter of 2010. Electricity will be supplied be from Nseki and Nzilo hydro plants via a DC-AC converter station, and ultimately from Inga once the stations are fully operational. To date there has been little action on the proposed construction of a 3,000 MW Inga-3 hydro-electric facility on the Congo River.

Lonshi Oxide Copper Mine - End of the Road

¶16. (SBU) First Quantum operates two mines in the DRC's "pedicle", with access from and egress to Zambia. The Lonshi mine works a very high-grade (8-10 percent) copper oxide deposit located in the DRC on the border with Zambia. It was the first greenfields copper mine built on either side of the Copperbelt in 33 years and produced 520,000 tons of ore grading 10.3 percent copper in 2006. First Quantum originally conducted exploration in the area to secure additional feed for its Bwana Mkubwa (BM) processing plant in Zambia and discovered the Lonshi oxide ore deposit in 2000. The deposit was originally discovered by Belgian geologists in the 1930s, but was never worked.

¶17. (SBU) Lonshi ore is produced by conventional open pit truck and excavator/shovel mining methods. The ore was for years trucked for processing at BM, which is a conventional copper oxide acid/leach, SE/EX plant located in Zambia some 35 kilometers to the west of the mine. This arrangement is a bone of contention as the Governor of Katanga Moise Katumbi closed the border to ore exports from Lonshi in November 2007, despite Central Government approval to export, according to the company. At the time of the team's visit the mine was sitting on some 700,000 tons of stockpiled high and low grade ore waiting for permission to move to BM. At the same time BM had only one working SX/EW circuit, was importing feed from other sources, and was operating at less than 50 percent of capacity. BM has produced cathode copper and sulfuric acid from Lonshi ore since ¶1998.

¶18. (SBU) Lonshi is scheduled to cease production from its open pit at the end of this year and is currently sinking a decline to evaluate the viability of underground mining of sulfide ore. It will take an estimated two years to convert to underground mining if proved viable. (Comment. It is not clear why the feasibility study was delayed until closure of the pit. If Lonshi does proceed with mining sulfide ore it will need to build a concentrator or have to transport ore to Frontier mine for processing. End Comment.) First Quantum owns 100% of Lonshi and acquired full rights to the mine under the new Congolese Mining Code in August 2003.

Frontier - a Lower Grade Mine

¶119. (SBU) First Quantum's \$226.4-million Frontier copper mine, also located in the DRC pedicile, achieved commercial production in November 2007 at a plant throughput of 15,000 tons (design capacity of 22,000 tons) of ore per day. The mine is 95 percent-owned by First Quantum and is a greenfield development relatively close to existing mine developments in the Zambian Copperbelt, which

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facilitates issues of access and housing. However, all mine site infrastructure was developed by the mine. The mine is located in south-eastern DRC, 45 kilometers north of Ndola on the Zambian Copperbelt. The main railway from the Copperbelt in Zambia to Lubumbashi in the DRC passes within 5 kilometers of the Frontier site.

¶120. (SBU) Mineralization at Frontier is sediment-hosted and occurs higher in the stratigraphic sequence than deposits in the traditional Copperbelt. The deposit occurs within veined and altered sediments of the Katanga Group and is located in the south-eastern extension of the Lufilian arc. The copper occurs mainly as sulfides within shales and conglomerates that have been highly faulted and folded. Measured and indicated sulfide resource at a 0.35 percent copper cut-off totals 182 million tons of ore grading 1.16 percent copper, equivalent to 2.1 million tons of copper. In addition, the deposit hosts an oxide/mixed resource of 26 million tons grading 1.19 percent copper, equivalent to 310,000 tons of copper. The oxide/mixed ore is stockpiled separately for possible processing in the future or for treatment at Bwana Mkubwa plant, should the GDRC's ban on ore exports be lifted.

¶121. (SBU) Frontier is a conventional sulfide ore open pit mining and processing operation. It has been designed to produce 1,000-1,200 tons of concentrate per day containing 27 percent copper. It produced 8,000 tons of copper in concentrate in 2007 and 84,000 tons in 2008. During the estimated 19-year mine life, Frontier is expected to produce 1.43 million tons of copper at an average 75,000 tons per year. The total concentrate will be shipped for smelting and refining in Zambian facilities, at least until such are built in the DRC. During the teams visit, the mine had a concentrate stockpile valued at \$100 million caused by the embargo on exports, which has subsequently been lifted. The mine employs 1,100 of whom 900 were local, and requires 26-28 megawatts of power from DRC utility SNEL, which is wheeled in through Zambia.

Ruashi - Another Mining Superlative

¶122. (SBU) Ruashi Mining Sprl is an exceptionally high-grade oxide orebody grading greater than 3.5 percent copper and just less than 1 percent cobalt. It also had some 3 million tons of stockpiled tailings from defunct mines, which enabled it to generate an early cash flow for mine development. The bulk of that resource has been processed through the Phase 1 Concentrator. The Ruashi mine is located only 10 kilometers from the Katanga provincial capital of Lubumbashi in southern DRC. The mine is 80 percent owned by Metorex, a South African middle-tier mining company, and 20 percent by the state-owned mining company Gecamines. Last measured reserves and resources are tabled below:

	Million Tons	%Copper	%Cobalt
Mineral Reserves	24,120,000	3.78	0.79
Mineral resources			
-- Mining Pit	35,530,000	3.74	0.46%
-- Stockpiles	2,720,000	1.86	0.35%
Total Resources	38,250,000	3.61	0.45%

¶123. (SBU) Production at Ruashi was planned in two phases. Phase I was commissioned in July 2006 to process some 56 oxide ore stockpiles and tailings dumps that surround the Ruashi and Etoile open pits (the Etoile pit was first mined in 1911) from a number of old defunct operations. Phase II comprises plans underway to build a new solvent extraction/electro-winning (SE/EW) plant to process

the high-grade Ruashi orebodies. A future Phase III would involve underground mining of primary sulfide ore that underlies the oxide cap currently being mined in the pits. The build-up of Phase II overlaps with Phase I and has resulted in higher tonnages treated and copper and cobalt output.

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¶24. (SBU) Production for 2008 is expected to increase as more ore from the Ruashi pit becomes available. The Phase I mine and the Zambian Sable processing facility annually produce 10,000 tons of copper cathode and 500 tons of cobalt in carbonate. Phase II will increase output by 45,000 and 3,500 tons, respectively, plus 500 tons per day of sulfuric acid. Phase II involves the expansion of the phase I concentrator and the construction of a new acid-leaching section, and an SX/EW plant for the production on site of copper metal (99.99 percent copper) and cobalt carbonate powder (25 to 27 percent cobalt). Capital expenditure for the metallurgical complex is forecast to be \$180 million to treat 120,000 tons of ore per month from two open pits at a headgrade of 3.5 percent copper. Full production is planned for 2009, and mine life is estimated to be at least 30 years.

¶25. (SBU) Currently, the oxide material is treated in the Ruashi concentrator where it is sulfurized and floated as an oxide concentrate. The concentrate is trucked to Metorex's Sable refinery complex north of Lusaka where copper metal and cobalt carbonate are produced. Production from the Ruashi open pits began in late 2007, the new copper refinery was commissioned at the beginning of 2008, the cobalt refinery should be commissioned by the end of the year, and the solvent extraction plant is still under construction. Once in full production in 2009, Ruashi will produce 40,000 to 45,000 tons per year of 99.99 percent copper metal and 3,500 tons of cobalt in carbonate. An additional 10,000 tons of copper and 500 tons of cobalt in carbonate will continue to be produced at the Sable facility.

Kinsevere - Anvil's Biggest Investment in the DRC

¶26. (SBU) Kinsevere is Australia-based Anvil's biggest investment in the DRC and is likely to become a large tonnage, high-grade, oxide-copper operation. Phase I of the project includes a major open pit mining operation, a heavy media separation (HMS) plant, and two electric-arc furnaces (EAF). Phase II will be a conventional acid/leach solvent extraction/electro-winning (SE/EW) circuit under development. A potential Phase III could be the development of an underground mine to exploit the primary sulfide ore lying below the oxide cap, and the possible construction of a sulfide circuit to process the ore. Phase I was commissioned in June 2007 at a cost of \$35-million to produce 25,000 tons of copper per year. Construction of Phase II began in the second half of 2007 and full production is expected by 2010. The capital cost of this phase has escalated to \$380 million. The mine is located 27 kilometers north of Lubumbashi.

¶27. (SBU) The Kinsevere orebody is abnormally thick because the 20-meter thick barren unit that usually separates the upper and lower orebodies of the Copperbelt is absent, and the overlying unit is also economic to mine. The latest reserve/resource estimates shows 50-million tons of ore grading 3.6 percent copper, but low in cobalt, and containing 1.8 million tons of copper. The deposits are hosted in the Lower Roan Supergroup/Mines Group in a mixed sequence of silica and carbonate rocks. The ore forms an oxide cap more than 100 meters thick, which overlies the primary sulfide mineralization.

¶28. (SBU) The Kinsevere mine has three ore bodies conducive to open-pit extraction, two of which are being developed for production and the third will be opened in about 9 years. The ore is 95 percent free digging and the stripping ratio is low at 2.7 tons of waste to 1 ton of ore. Mining on both deposits has operated at full capacity since January 2007. During the last seven months of 2007, the mine produced 13,006 tons of copper from concentrates grading 27% copper. When the two electric-arc furnaces are commissioned, which is scheduled for later in 2008, the mine will also produce

90-95 percent "black copper" ingots. Kinsevere is forecast to produce 28,500 tons of copper in 2008, of which some 10,000 tons will be "black copper". The mine receives 39.5 megawatts of hydro-electric power from SNEL. Currently the fine tailings (average grade of 2.9 percent copper) and HMS light fraction (average grade 4.3 percent copper) are stockpiled for future processing in the Phase II SX/EW plant. Phase II will produce 60,000 tons of A-grade cathode copper (99.99 percent copper) per year by 2010.

Comment

¶29. (SBU) A calculation of the copper and cobalt production from only the DRC mines visited shows that if all goes as planned, the six mines should produce about 260,000 tons of copper and 17,000 tons of cobalt annually in the next two to three years. Based on the mines' expansion plans, this could increase to over 700,000 tons copper and 65,000 tons cobalt per year within the next five years. These calculations do not take into account new and expanded production from other mines in the DRC or production from Zambia. The cobalt consumption estimate for 2012 ranges from 97,000 to 105,000 tons. There is a possibility that cobalt may be in over supply at that time.

¶30. These DRC mines with western investors are bringing significant skills transfer, social development, and tax revenues to the DRC. They are working with NGOs and the GDRC to integrate or ameliorate the lot of numerous artisanal miners. The companies are grappling with uncertainty related to the DRC mining review, corruption, and dilapidated infrastructure. The GDRC legitimately seeks to gain adequate benefits to the country through the license review, but still needs to assure transparent oversight and transfer of these benefits to its people.

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